

NASA/TM-2003-xxxxxx

MODIS Validation, Data Merger and Other Activities Accomplished by the SIMBIOS Project: 2002-2003

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August 2003

Chapter 5

Overview of SeaBASS and MODIS Validation Activity

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5.1 INTRODUCTION

High quality *in situ* measurements are a prerequisite for satellite data product validation, algorithm development, and many climate-related inquiries. As such, the SIMBIOS and SeaWiFS Projects maintain a local repository of *in situ* bio-optical data, known as the SeaWiFS Bio-optical Archive and Storage System (SeaBASS), to support and sustain regular scientific analyses (Hooker et al. 1994, Werdell and Bailey 2002). This system was originally populated with radiometric and phytoplankton pigment data used in the SeaWiFS Project's satellite validation and algorithm development activities. To facilitate the assembly of a global data set, however, under NASA Research Announcements NRA-96-MTPE-04 and NRA-99-OES-99, SeaBASS was broadened to include oceanographic and atmospheric data sets collected by the SIMBIOS Project. This aided considerably in minimizing spatial and temporal biases in the data while maximizing acquisition rates (Fargion and McClain 2003). To develop consistency across multiple data contributors and institutions, the SIMBIOS Project also defined and documented a series of *in situ* sampling strategies and data requirements that ensure that any particular set of measurements are appropriate for algorithm development and ocean color sensor validation (Mueller et al., 2003).

The SeaBASS bio-optical data set includes measurements of apparent and inherent optical properties, phytoplankton pigment concentrations, and other related oceanographic and atmospheric data, such as water temperature, salinity, and aerosol optical thickness. Data are collected using a number of instrument packages from a variety of manufacturers, such as profilers and handheld instruments, on a variety of platforms, including ships and moorings. As of May 2003, SeaBASS included data collected by research groups at 44 institutions in 14 countries, encompassing over 1,150 individual field campaigns (Figure 5.1). These data include over 300,000 phytoplankton pigment concentrations, 13,500 continuous depth profiles, 15,000 spectrophotometric scans, and 15,000 discrete measurements of AOT. The SIMBIOS Project Office makes use of a rigorous series of submission protocols and quality control metrics that range from file format verification to inspection of the geophysical data values (Fargion et al. 2001, Werdell and Bailey 2002). This ensures that observations fall within expected ranges and do not clearly exhibit characteristics of measurement problems.

5.2 DATA ACCESSIBILITY

The data included in SeaBASS are readily available to members of the MODIS Science Team for use in their validation and algorithm development activities. The SeaBASS World Wide Web site, located at: <<http://seabass.gsfc.nasa.gov>>, provides a complete description of the system architecture, comprehensive documentation on policies and protocols, and direct access to the bio-optical data set and validation results. Through the use of online search engines, the full bio-optical data set is searchable and available to authorized users via the Web. Note that all online resources described below are linked to the main URL provided above. To protect the publication rights of contributors, access to data collected more recently than 1 January 2000 is limited to SIMBIOS Science Team members, NASA-funded researchers (such as MODIS Science Team members), and regular voluntary contributors, as defined by the SeaBASS access policy (Firestone and Hooker 2001). The remainder of the data is fully available to the general public and, additionally, has been released to the National Oceanic and Atmospheric Administration's (NOAA) National Oceanographic Data Center (NODC) for inclusion in their archive.

Several search engines are available to locate and extract data files and geophysical data values from the bio-optical data set, including the Bio-optical Search Engine, Pigment Locator, and Aerosols Locator. Other search engines are available for compiling metadata relating to the bio-optical data set, such as the General Search Engine and Cruise Search Engine. The latter provide generic information about the data, such as cruise and experiment names, date and location ranges, data parameters collected, and contributor names. For all of the above, visitors may limit queries to particular experiments, contributors, date and location ranges, and data types (e.g., chlorophyll *a* or water-leaving radiance). A series of supplementary Web pages are linked to each search engine with tables listing additional relevant information, for example, the names of archived experiments or data types, to assist users narrow or tailor their queries. On occasion, JavaScript pop up windows are used to provide definitions or explanations of an online feature.